UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/262,530	03/04/1999	ALFONSO B. PICCIRILLI	1-75	9521

7590 02/22/2007

JOSEPH B. RYAN
RYAN, MASON & LEWIS, LLP
90 FOREST AVE.
LOCUST VALLEY, NY 11560

EXAMINER	
BELLO, AGUSTIN	
ART UNIT	**PAPER NUMBER**
2613	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/22/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	09/262,530	PICCIRILLI ET AL.	
	Examiner	Art Unit	
	Agustin Bello	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 December 2006* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 July 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claim 1, 2, 7, 9, 15, 20, 28, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dugan (U.S. Patent No. 5,710,650) in view of Mendez (U.S. Patent No. 6,025,944) and Takeguchi (U.S. Patent Application Publication No. 2002/0018261).

Regarding Claim 1, Dugan teaches a method for transmitting data content provided in a data signal, comprising, assigning distinct non-overlapping portions of the data signal to two or more respective channels for each channel (abstract), using corresponding assigned portions of the data signal to modulate an optical carrier at a respective wavelength associated with that channel (reference numeral 40,42 in Figure 2), and transmitting an optical output signal that comprises modulated carrier energy at each of the respective wavelengths, such that data content is carried, in the transmitted optical output signal, by energy at two or more of the respective wavelengths (see abstract, column 3 lines 1-6).

Dugan differs from the claimed invention in that Dugan fails to specifically teach that the assigned portions of the data signal each have the same bit rate as the data signal itself. However, Takeguchi in the same field of optical communication teaches that this concept is well known in the art (paragraph [0052]). One skilled in the art would have been motivated to assigned portions of the data signal so that each have the same bit rate as the data signal itself

in order to allow the receiving side of the system to easily receive and decode the signal. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to assigned portions of the data signal to each have the same bit rate as the data signal itself.

Dugan further differs from the claimed invention in that Dugan fails to specifically teach that the assignment of the portions to the channels is implemented in a permuted manner which makes it difficult for an unauthorized user having no knowledge of the assignment to reconstruct the data signal from received portions thereof. However, Mendez, in the same field of optical communication teaches that the permutation of portions of an optical channel is well known in the art (column 13 lines 14-42). One skilled in the art would have been motivated to permute the portions of an optical channel in order to provide less pseudo noise clutter in the system (column 13 lines 39-41), improve bandwidth efficiency (column 13 lines 31-36), and further to secure the communications of the network as claimed. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to permute the portions of an optical channel of Dugan as taught by Mendez.

Regarding Claim 2, Dugan teaches the method of claim 1, wherein the modulated carrier energy is transmitted in sequential segments, each such segment having a respective wavelength (inherent in a wavelength multiplexed signal and column 3 lines 1-6).

Regarding Claim 7, Dugan teaches the method of claim 1, wherein the transmitting step comprises launching the optical output signal into an optical fiber (reference numeral 48 in Figure 1).

Regarding Claim 9, Dugan teaches the method of claim 1, wherein, the data signal is an electrical signal, (reference numeral 32 in Figure 1), the assigning step comprises deriving two or

more electrical driver signals from the data signal (reference numeral 16, 18, 20, 22, 40, 42 in Figure 1), each driver signal corresponding to a respective channel (reference numeral 42 in Figure 1), and the modulating step comprises using each driver signal to cause a respective optical emission device to emit an optical signal at a respective wavelength (column 5 lines 25-34).

Regarding Claim 15 and 28, Dugan teaches a method of optical communication, comprising receiving an optical signal that contains energy in two or more distinct wavelength channels, assembling portions of the received optical signal, from distinct wavelength channels, into a single, sequential data stream and recovering data content from the assembled data stream, recovering the data content from the assembled data stream (column 3 lines 9-16), wherein the portions of the received optical signal from the distinct wavelength channels are respective non-overlapping portions of the single sequential data stream with each such non-overlapping portion having the same bit rate as the single sequential data stream (as noted in the rejection of claim 1); and wherein assignment of the portions to the channels is implemented in a permuted manner which makes it difficult for an unauthorized user having no knowledge of the assignment to assemble the single sequential data stream from said portions (as noted in the rejection of claim 1).

Regarding Claims 20 and 31, Dugan teaches the method of claim 15, wherein the method further comprises optically demultiplexing the received signal, thereby to provide two or more single-channel optical signals, the method further comprises detecting each of the single-channel signals, thereby to provide two or more single-channel electronic signals; and the assembling step comprises electronically multiplexing the single-channel electronic signals (see Figure 2 and column 3 lines 9-16).

3. Claims 3, 8, 12-14, 16, 22, 25, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dugan in view of Mendez and Takeguchi, as applied to claim 1 above, and further in view of Hait (U.S. Patent No. 6,256,124).

Regarding Claims 3 and 22, the combination of Dugan, Mendez and Takeguchi teaches the limitations of claim 1, but differs from the claimed invention in that it fails to specifically teach that the assigning step comprises assigning, to each channel, those portions of the data signal that coincide with a recurring time window allocated to that channel. However, Dugan suggest that timing is used when assigning data to each wavelength channel (reference numeral 24, 38 in Figure 1, column 5 lines 15-18, column 6 lines 22-25, column 7 lines 3-6). Furthermore, Hait, in the same field of endeavor, teaches an assigning step in a parallel-to-series data converter which entails assigning data to a wavelength carrier prior to multiplexing according to timing signal (reference numeral 35,44,46,47 in Figure 2, column 2 lines 18-25, column 4 lines 33-50, column 5 lines 1-11, 26-31). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have assigned data to an optical wavelength according to a time window allocated to that channel, as suggested by Dugan and taught by Hait, in order to form sequential data frames having a smaller bandwidth than the original data signal, thereby lowering the bandwidth requirement of the system.

Regarding Claim 8, the combination of Dugan, Mendez and Takeguchi teaches the method of claim 1, but differs from the claimed invention in that it fails to specifically teach that the transmitting step comprises launching the optical output signal into free space. However, Hait teaches that in a parallel-to-series data conversion comprising the wavelength multiplexing of a plurality of data signals, it is possible to launch the optical output signal into free space (column 6 lines 3-4). Therefore, it would have been obvious to one skilled in the art at the time

the invention was made to have launched the optical output signal into free space as taught by Hait in order to facilitate remote data transmission without the use of fibers.

Regarding Claims 12-14 and 27, the combination of Dugan, Mendez and Takeguchi teaches the limitations of claim 1, and further teaches that the data signal is an electrical signal (reference numeral 32 in Figure 1 of Dugan) and that the assigning and modulating steps comprise using the data signal to modulate the output radiation such that each portion of the data signal is modulated onto an assigned wavelength of output radiation (as discussed in claims 1 and 2), but differs from the claimed invention in that it fails to specifically teach operating a tunable light source to produce output radiation that varies stepwise in wavelength according to a pattern. However, Hait teaches using a tunable light source in order to achieve wavelength multiplexing of a TDM signal according to a pattern (column 4 lines 42-67, column 5 lines 1-11, column 11 lines 28-43). Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have used a tunable light source as the source of radiation, as taught by Hait, in the device of Dugan, in order to reduce the number of light sources required to achieve wavelength multiplexing of TDM signals.

Regarding Claim 16, the combination of Dugan, Mendez, Takeguchi and Hait teach the limitations of this claim in view of the rejection of claim 3, with the process reversed at the receiver.

Regarding Claim 25, Dugan teaches that the data signal source is an electronic signal source (reference numeral 32 in Figure 1), the apportioning system comprises an electronic demultiplexer operative in response to the data signal to generate two or more distinct driver signals (inherent in the separation of a high bit rate signal into a plurality of low bit rate signals and reference numeral 16, 18, 20, 22, 40 in Figure 1) the apportioning system further comprises a

respective optically emissive device (reference numeral 44 in Figure 1) operative in response to each driver signal to generate a corresponding optical signal in a distinct wavelength channel, and the output element comprises an optical multiplexer (reference numeral 46 in Figure 1) operative to combine the respective optical signals and couple them into the transmission medium.

4. Claims 4-6, 17-19, 23-24, 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dugan in view of Mendez, Takeguchi, Hait, and Chang (U.S. Patent No. 6,160,651).

Regarding Claims 4, 5, 23, and 24, the combination of Dugan, Mendez, Takeguchi and Hait teach or suggest the limitations of claims 3, but differs from the claimed invention in that they fail to specifically teach permuting the recurring time windows allocated to the channels, such that data content carried in the transmitted optical output signal occurs in a different sequence from the data content provided in the data signal. However, Hait further teaches the use of delays that can be used to vary the introduction of the multiplexed signal to output fiber as well as the transmission protocol of the output signal. Furthermore, Chang teaches a method for securing data transmitted over a network via a plurality of wavelengths wherein it is possible to vary the data format and protocol (column 5 lines 62-67, column 6 lines 1-21), thereby preventing eavesdropping. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have permuted the recurring time windows allocated to the channels via the manipulation of the delay lines taught by Hait so that data signals to be wavelength multiplexed are introduced into the fiber in sequence different from the input data sequence thereby observing the suggestion by Chang to vary the data format and protocol in order to secure the data transmitted over the network from eavesdropping.

Regarding Claim 6, the combination of references teach the method of claim 5 further comprising transmitting, as part of the optical output signal, information that describes how the time windows were permuted (column 5lines 57-61 of Dugan, column 5 lines 27-47 of Chang, and the clock signal transmitted in Dugan).

Regarding Claims 17-19, 29, 30 the combination of Dugan, Hait, and Chang teach the limitations of this claim in view of the rejection of claims 4 and 5, the process at the receiver being reversed from the process at the transmitter.

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Dugan, Mendez, and Takeguchi in view of Norte in the article "All-Optical TDM-to-WDM Data Format Conversion in a Dynamically Reconfigurable WDM Network."

Regarding Claims 10, the combination of Dugan, Mendez, and Takeguchi teaches the method of claim 1, but differs from the claimed invention in that it fails to specifically teach that the data signal is an optical signal having a wavelength λ_D, and the modulating step comprises providing optical radiation at two or more wavelengths to be referred to as coding wavelengths, and mixing a respective portion of the data signal with optical radiation at each of the coding wavelengths in a nonlinear optical device, thereby to generate modulated radiation having a wavelength different from the wavelength λ_D and the coding wavelengths. One skilled in the art would clearly have recognized that the method of converting a TDM signal to a WDM according to the teachings of Dugan would have been time consuming and costly. However, Norte teaches a system that operates according to the limitations of the claim (see Figure 1-4) that provides a time and cost advantage over the method of Dugan (column 1 lines 30-37 of Norte). Since both Dugan and Norte are concerned with TDM-to-WDM conversion of a data signal via different wavelengths, one skilled in the art could have successfully implemented the method of

modulation taught by Norte in the modulation step taught by Dugan. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have modulated the optical signals according to the teachings of Norte in the modulation step taught by Dugan.

6. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Dugan, Mendez, Takeguchi, Hait, Chang (U.S. Patent No. 6,160,651) in view of Norte in the article "All-Optical TDM-to-WDM Data Format Conversion in a Dynamically Reconfigurable WDM Network."

Regarding Claim 11, the combination of Dugan, Hait, Takeguchi and Chang teach the limitations of claim 6, but differ from the claimed invention in that they fails to specifically teach the assigning step comprises assigning, to each channel, those portions of the data signal that coincide with a recurring time window allocated to that channel; the optical radiation at each of the coding wavelengths is provided in the form of a train of pulses; each train of pulses corresponds to a recurring time window allocated to one of the channels; and the respective wavelength associated with each of the channels is a wavelength of modulated radiation generated by said non-linear mixing. However, Norte, in the same field of endeavor, teaches a system that operates according to the limitations of the claim (see Figure 1-4) that provides a time and cost advantage over the method of Dugan (column 1 lines 30-37 of Norte). Since the combination of Dugan, Hait and Chang and Norte are concerned with TDM-to-WDM conversion of a data signal via different wavelengths, one skilled in the art could have successfully implemented the method of modulation taught by Norte in the modulation step taught by Dugan. One skilled in the art would clearly have recognized the time and cost advantage of the method taught by Norte. Therefore, it would have been obvious to one skilled in the art at the time the

invention was made to have modulated the optical signals according to the teachings of Norte in the modulation step taught by the combination of Dugan, Hait and Chang.

7. Claims 21 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Dugan, Mendez, Takeguchi in view of Norte in the article, "Demonstration of an All-Optical Data Format Transparent WDM-to-TDM Network Node with Extinction Ratio Enhancement for Reconfigurable WDM Networks."

Regarding Claims 21 and 32, the combination of Dugan, Mendez, Takeguchi teaches the limitation of claim 15 and 28, and further teaches optically demultiplexing the received signal thereby to providing two or more single-channel optical signals (see Figure 2 of Dugan), but differs from the claimed invention in that it fails to specifically teach the method further comprising, shifting each of the single-channel signals into a common wavelength channel by non-linear optical mixing, and the assembling step is carried out by optical multiplexing. One skilled in the art would clearly have recognized that the method of converting a WDM signal to a TDM according to the teachings of Dugan would have been incur penalties during the conversion of the data. However, Norte teaches a system that operates according to the limitations of the claim (see Figure 1-4) that provides a penalty free method of conversion which is clearly advantageous over the method of Dugan (abstract of Norte). Since both Dugan and Norte are concerned with WDM-to-TDM conversion of a data signal via different wavelengths, one skilled in the art could have successfully implemented the method of shifting taught by Norte to assemble the received data in the system taught by Dugan. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have, shifted each of the single-channel signals into a common wavelength channel by non-linear optical mixing the

optical signals to assemble the received data according to the teachings of Norte in the system taught by Dugan.

8. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Dugan, Mendez, Takeguchi, and Hait in view of Norte in the article "All-Optical TDM-to-WDM Data Format Conversion in a Dynamically Reconfigurable WDM Network."

The combination of Dugan and Hait teach the limitations of claim 22, and as discussed regarding claim 10, Norte teaches a system that operates according to the limitations of the claim (see Figure 1-4). One skilled in the art would clearly have recognized that the method of converting a TDM signal to a WDM according to the teachings of Dugan would have been time consuming and costly. However, Norte teaches a system that operates according to the limitations of the claim (see Figure 1-4) that provides a time and cost advantage over the method of Dugan (column 1 lines 30-37 of Norte). Since both Dugan, Hait, and Norte are concerned with TDM-to-WDM conversion of a data signal via different wavelengths, one skilled in the art could have successfully implemented the method of apportioning taught by Norte in the apportioning system taught by Dugan and Hait. Therefore, it would have been obvious to one skilled in the art at the time the invention was made to have apportioned the optical signals according to the teachings of Norte in the apportioning step taught by Dugan.

Response to Arguments

9. Applicant's arguments with respect to claims 1-32 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Agustin Bello whose telephone number is (571) 272-3026. The examiner can normally be reached on M-F 8:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571)272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

A. Bello

Agustin Bello
Primary Examiner
Art Unit 2613

AB